

RDT-5

Dual Phase Digital Thermostat



Installation Manual

P/N: 110148

www.rottem.com

Take Control[®]

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1 FRONT MATTER

This section includes information on the manual and general information.

1.1 Introduction

Rotem manuals provide easy-to-use information regarding the installation, operation, long/short term planning and parts listing (this manual may not deal with all of the above subjects). The table of contents is an outline of the relevant information in this manual.

Read this manual before operating your Rotem product. Using this equipment for any other purpose or in a way not within the operating recommendations specified in this manual will void the warranty and may cause personal injury.

If you have any questions or comments regarding your product please contact your local Rotem dealer.

1.2 Conventions

NOTE: Notes provide important details regarding specific procedures.

CAUTION Cautions alert you to potential damage to the controller if the procedures are not followed carefully.

WARNING! Warnings alert you to potentially hazardous situations which, if not avoided could result in death or personal injury.

1.3 Contact Information

Rotem Control and Management

Email: support@rotem.com URL: www.rotem.com

1.4 Document Information

Revision History

Revision Level / Date	Section Affected	Description
1.0 / May 2013		Release document
1.0 / Feb 2012		Release document
1.1 / May 2012	6	Changed operating range and added caution
1.2 / July 2012	5.2.2	Added note regarding resistors
1.3 / August 2012	5.2.1	Added section on jumpers
1.4 / June 2013	5.2 / 6	Changed wiring diagrams and specs
1.5 / Sept 2013	4.2.1	Added quick start
1.6 / Nov 2014	5.2	Edited graphic
1.7 / May 2014	4.2	Added the cold start

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2 PRECAUTIONS

- Always connect temperature and sensor shields to earth ground. Avoid mixing high voltage wiring with sensor and low voltage wiring.
- Keep the controller as far as possible from heavy contactor boxes and other sources of electrical interference.

3 INTRODUCTION TO THE RDT-5

The Dual Phase RDT-5 is a five stage digital thermostat that works in conjunction with the RBU-27 backup units and Platinum Controllers. The RDT-5 works as a stand-alone unit, using its own temperature to activate the backup system.

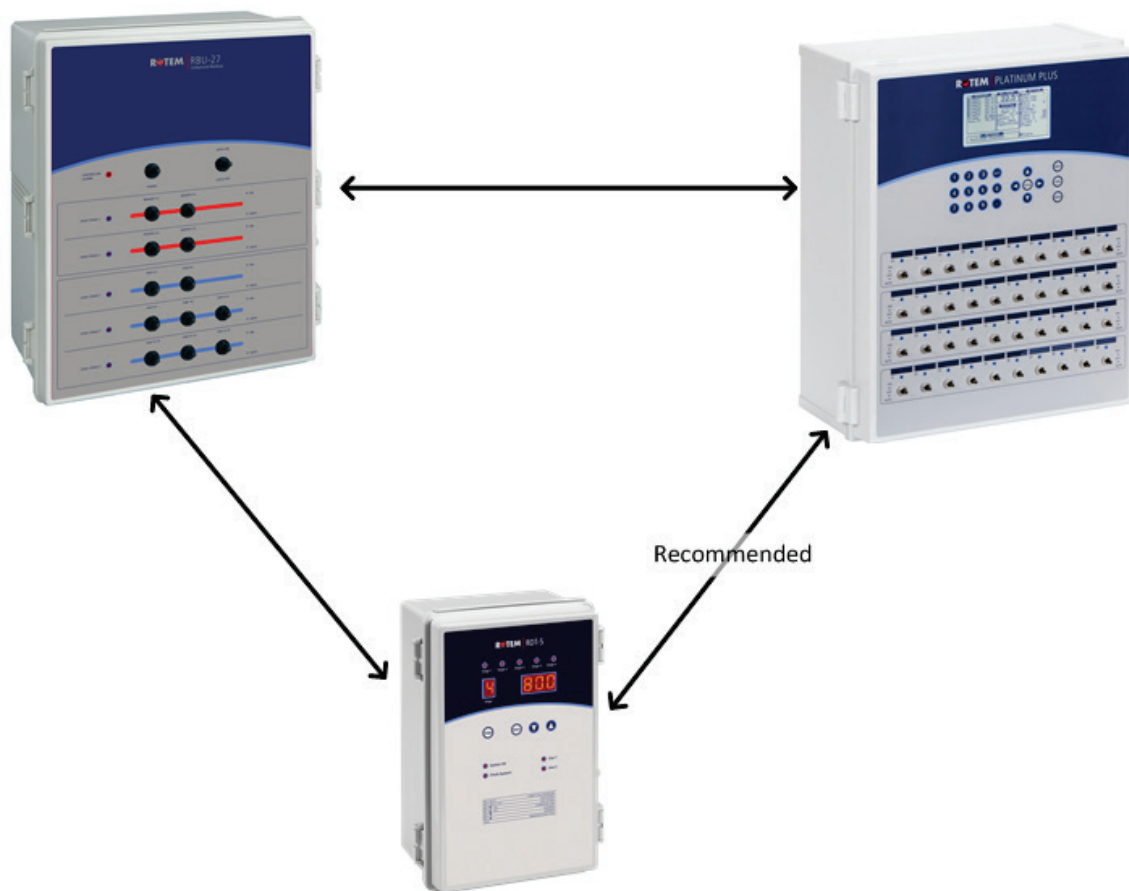


Figure 1: RDT-5 Block Diagram

Digital thermostats provide highly accurate readings, ensuring that both the Platinum Controller and RBU-27 function according to specifications.

3.1 Features

- 5 independent thermostats
- Each stage can be set to backup cooling or heating operations
- Three point and three day temperature curve
- Works as a standalone or with Platinum:
- Displays:
 - stage temperature
 - state

- system information
- Alarm logic detects failures
- Comes equipped with built-in power and input protection
- No software needed to run the unit; software is used to configure the unit only

3.2 Indicator LEDs

The following table defines the LED indicators when the LED is green.

Table 1: LED Indicators

LED	Definition of Green LED
Stage 1 – 5	Thermostats are operational
System OK	System functioning properly
Check System	CPU is not functioning
Line 1	Power source one is supplying power
Line 2	Power source two is supplying power

NOTE: The System OK and Check System LEDs are never both lit.

3.3 Display Abbreviations

The RDT-5 three (3) digit display window shows different abbreviations. The following table explains these abbreviations.

Table 2: RDT Abbreviations

Abbreviation	Meaning
-t-	Temperature
dif	Differential (temperature difference between the temperature curve and the required temperature to operate coolers or heaters)
F.d	First day
F.t	First temperature
S.d	Second day
S.t	Second temperature
L.d	Last day
L.t	Last temperature
PrE	Standalone mode
Aut	Platinum mode
C	Centigrade
F	Fahrenheit
day	Current growth day
Hr	Hour
nṡi	Minute

4 USING THE RDT-5

The following sections describe how to use the RDT-5.

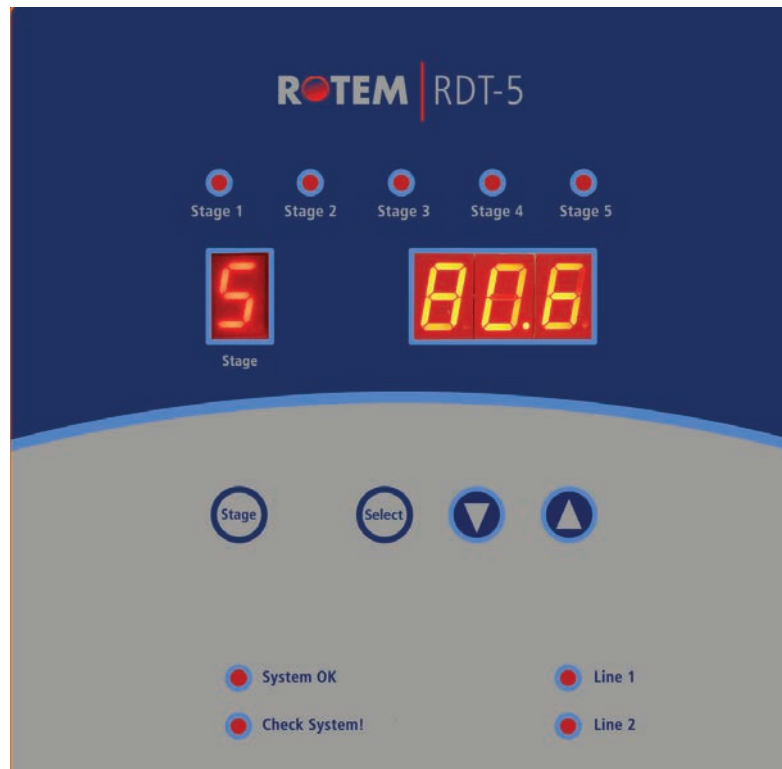


Figure 2: RDT-5 Front Panel

4.1 RDT Keyboard

- Use the **Stage** key to navigate between the stages. The current stage is always displayed in the one digit window (Reading the Main Screen).
- Use the **Select** key to:
 - display the current temperature (Displaying the Current Temperature)
 - set the target temperatures (Configuring the Basic Settings)
- Use the Down key to:
 - decrease parameter settings
 - set the temperature curve (Configuring the Temperature Curve)
- Use the **Up** key to
 - increase parameter settings
 - set the RDT-5 parameters (Configuring the Basic Settings)

4.2 Cold Start

Cold Start returns the unit to its default settings. Only perform this procedure when advised to do so by your dealer or a Rotem technician.

To perform a Cold Start:

1. Disconnect power.
2. Apply power while pressing **Select**, **Up Arrow**, and **Down Arrow**.
3. When Cold Start Screen appears, press **Select**.

4.3 RDT-5 Configuration

The following sections explain how to configure the RDT-5.

- Quick Start
- Reading the Main Screen
- Displaying the Current Temperature
- Configuring the Basic Settings
- Configuring the Stage Activation Temperature
- Configuring the Temperature Curve

4.3.1 Quick Start

This section describes the basic setup steps. For more detailed information refer to the subsequent sections.

1. Press **Select quickly**. The unit displays the current temperature.
2. Press **Down Arrow** for three seconds. Set the general settings.
3. Press **Select** for three seconds. The three digit display shows current stage activation temperature and “dif”. Use the arrow keys to modify the dif.
4. Press **Up Arrow** for three seconds. The three digits display **F.d** and **1** (Stage 1). Use the arrow keys to set the day.

4.3.2 Reading the Main Screen

The RDT-5 Main Screen displays the:

- current stage
- **target** temperature

In Figure 2, the current stage is Stage 5 and the target temperature is 20.6° C.

To navigate between stages:

- Press the **Stage** key. The Stage display and corresponding target temperature changes.

4.3.3 Displaying the Current Temperature

To display the current temperature:

1. Press **Select quickly**.
The three digit display shows current temperature and “-t”.
2. Press **Stage** to navigate between stages.

NOTE: After 10 seconds of inactivity on the keyboard, the display returns to the Main Screen.

4.3.4 Configuring the Basic Settings

There are several parameter settings which must be set before configuring target temperatures and temperature curves. These parameters are not displayed.

- Mode
- Centigrade/Fahrenheit
- Current growth day
- Clock time (hour/minute)

The RDT-5 can work as in standalone mode (PrE) or in conjunction with the Platinum controller (Aut). In standalone mode, the RDT-5 sets the target temperature curve (and the differential related to it). When working with the Platinum, the RDT sets the differential related to the Platinum target temperature.

NOTE: In the current edition, only the standalone mode is supported. The instructions below are only relevant for the standalone mode.

To set the basic settings:

1. Press **Down Arrow** for three seconds.
The three digit display shows **PrE** or **Aut**.
2. Use the arrow keys to select **PrE**.
3. Press **Select**.
Use the arrow key to select **C** or **F**.
4. Press **Select**.
The three digit display shows **dAY** and the current setting.
5. Use the arrow keys to set the current day.
Press **Select**.
6. The three digit display shows **Hr** and the current hour value.
Use the arrow keys to set the hour.
7. Press **Select**.
The three digit display shows **n᠒i** and the current minutes value.
8. Use the arrow keys to set the minutes
9. Press **Select**.
 - Values are saved to memory.
 - The display returns to the Main Screen.

4.3.5 Configuring the Stage Activation Temperature

The stage activation temperature determines when cooling and heating operations take place. RDT-5 enables setting a separate stage activation temperature for each stage.

NOTE: Configure each relay to cool or heat; refer to Selecting Heating or Cooling Functions, page 13.

To set the stage activation temperature:

1. Press **Select** for three seconds.
The three digit display shows current stage activation temperature and “dif”.
2. Using the arrow keys, modify the parameter.
3. Press **Stage** to switch to the next stage and modify as required.
4. Repeat as needed.
5. Press **Select** to save the settings.
 - Values are saved to memory.
 - The display returns to the Main Screen.

NOTE: After 60 seconds of inactivity on the keyboard, the display returns to the Main Screen.


4.3.6 Configuring the Temperature Curve

RDT-5 enables setting a three point/three day temperature curve.

To configure the temperature curve:

1. Press **Up Arrow** for three seconds.
The three digit displays **F.d** and **1** (Stage 1).
2. Use the arrow keys to set the day.
3. Press **Select**.
The three digit displays **F.t** and the current curve setting.



- 
4. Use the arrow keys to set the curve setting.
 5. Press **Select**.
The three digit displays **S.d** and the current value.
 6. Use the arrow keys to set the day.
 7. Press **Select**.
The three digit displays **S.t** and the current curve setting.
 8. Use the arrow keys to set the curve setting.
 9. Press **Select**.
The three digit displays **L.d** and the current value.
 10. Use the arrow keys to set the day.
 11. Press **Select**.
The three digit displays **L.t** and the current curve setting.
 12. Use the arrow keys to set the day.
 13. Press **Select**.
 - Values are saved to memory.
 - The display returns to the Main Screen.

NOTE: After 60 seconds of inactivity on the keyboard, the display automatically returns to the Main Screen.

5 INSTALLATION

The following sections detail the installation procedures.

- Mounting
- Wiring

5.1 Mounting

When installing the unit, observe the following rules:

- The RDT-5 must be installed by an authorized electrician. When installing the unit, disconnect the power to avoid electrical shock and damage.
- To avoid exposing the **RSP-5** to harmful gases or high humidity, it is recommended to install it in the service room.
- Installation Category (Overvoltage Category) III.
- The power supply to the controller should be protected by a 5 Amps circuit breaker.

To mount the RDT:

1. Mount the RDT-5 vertically on the wall, using the four supplied screws through the mounting holes.



Figure 3: Mounting Hole

2. To open the enclosure, unclip the two left-side clips in the front.
3. On the side of the box, drill holes to size for routing cables.
4. Connect the wires according to the wiring diagrams detailed in the next section.

5.2 Wiring

The following sections detail the RDT-5 wiring. Figure 4 displays the RDT-5 layout.

- Selecting Heating or Cooling Functions, page 13
- RDT – RTS Wiring, page 14
- Platinum – RDT Wiring, page 15
- Powering the RDT, page 16
- Alarm Wiring, page 16



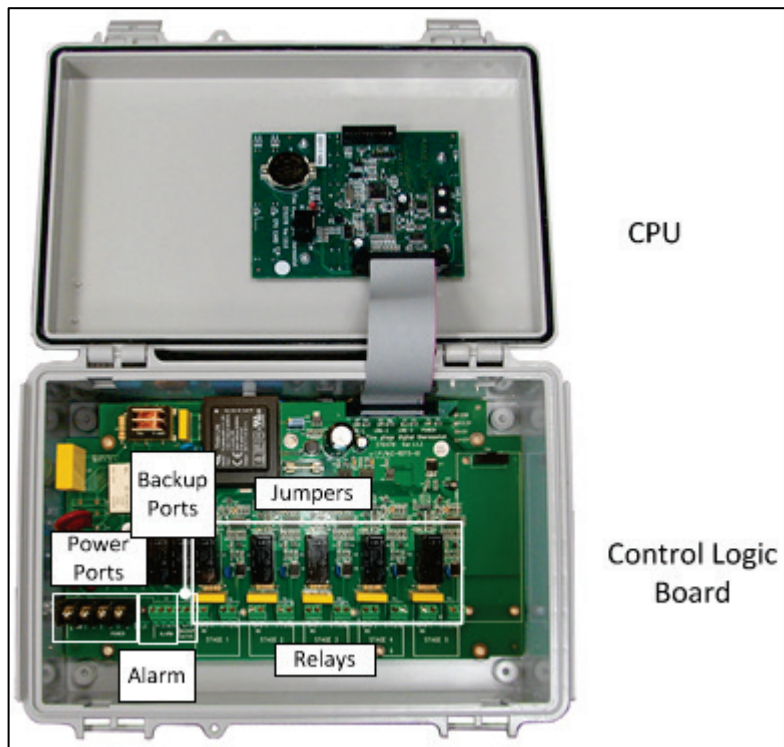


Figure 4: RDT-5 Boards and Ports

5.2.1 Selecting Heating or Cooling Functions

Each relay must be set to operate a heater or cooler.

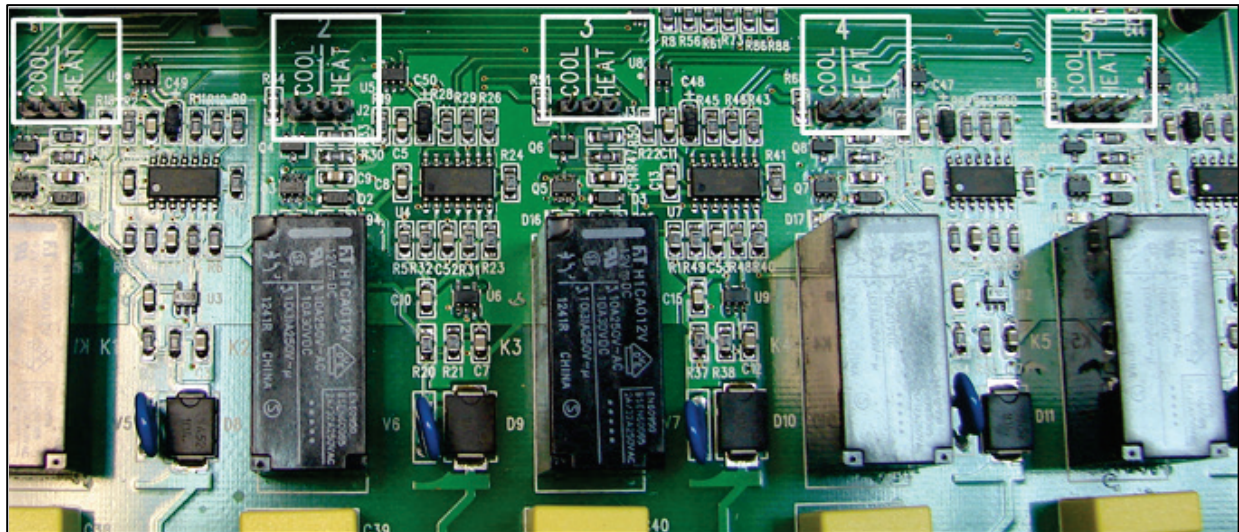


Figure 5: Jumpers Locations

To set the relay function:

- On each relay, place the jumper over the required pins. Figure 6 displays two examples.

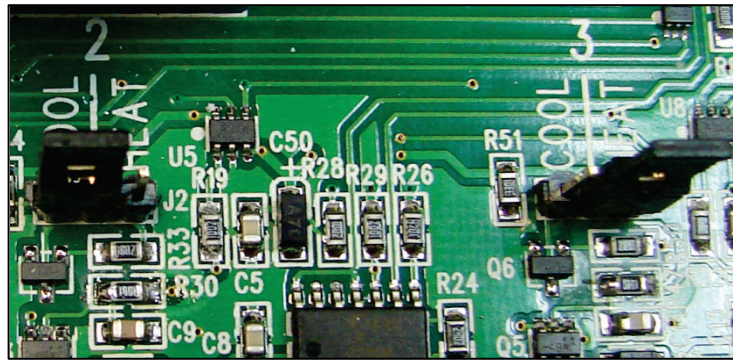


Figure 6: Cooling and Heating Jumpers

5.2.2 RBU – RDT Wiring

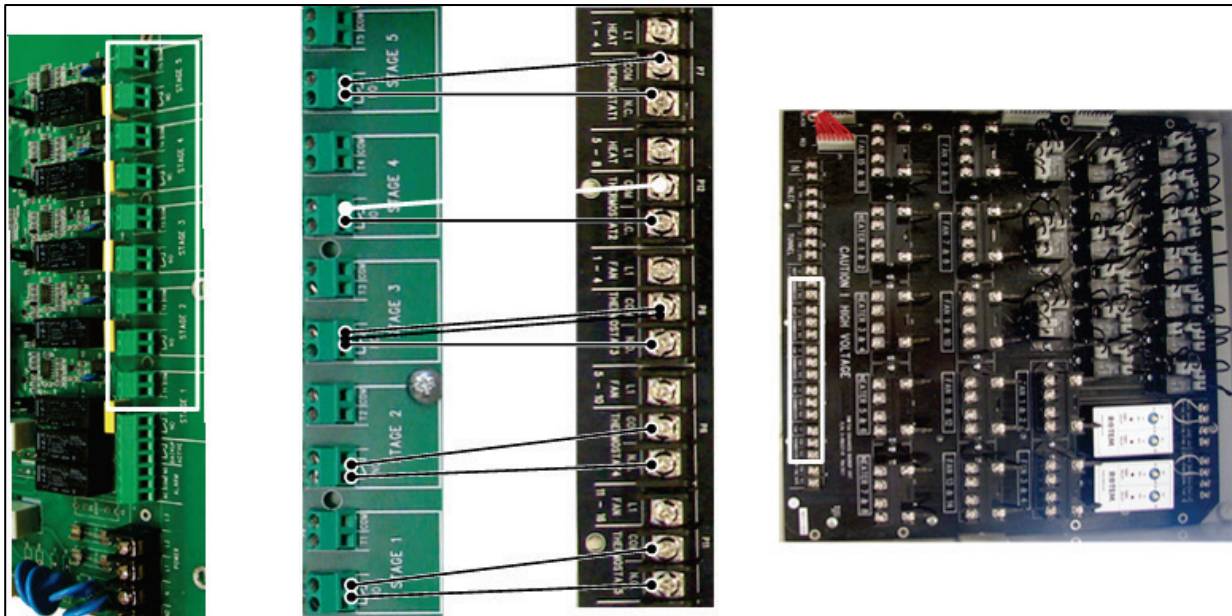


Figure 7: Wiring Between RDT-5 and RBU-27

5.2.3 RDT – RTS Wiring

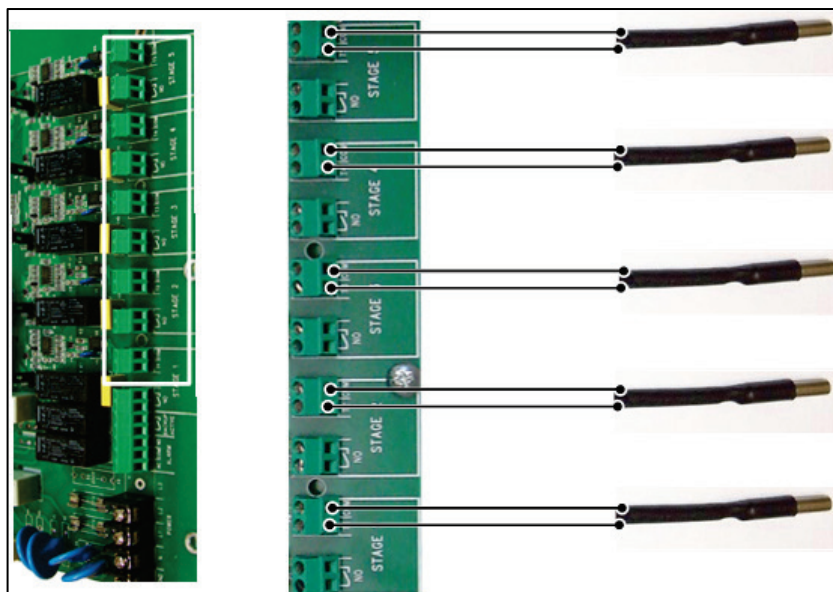


Figure 8: Wiring Between RDT-5 and RTS-2

NOTE: Ensure that each temperature sensor is installed correctly in the required location.

NOTE: If a 30 KOhm resistor is installed in place of a temperature sensor, the stage is non-operational. To enable stage operation, remove the resistor and install a sensor.

CAUTION Note: Any stage having neither a sensor nor a resistor causes an alarm (Sensor Failure Event).

5.2.4 Platinum – RDT Wiring

The RDT-5 can be wired directly to the Platinum's digital input card. In this configuration, RDT-5 can provide two functions:

- The Platinum transmits an alarm to a PC in the event of a RDT-5 power or sensor failure. In this configuration the RDT-5 functions when the Platinum has a problem with its:
 - relays
 - breakers
 - sensors
- The Platinum transmits an alarm when RDT-5 activates one of the stages

CAUTION While both of these functions are optional, Rotem strongly recommends wiring the RDT-5 to Platinum Controllers.

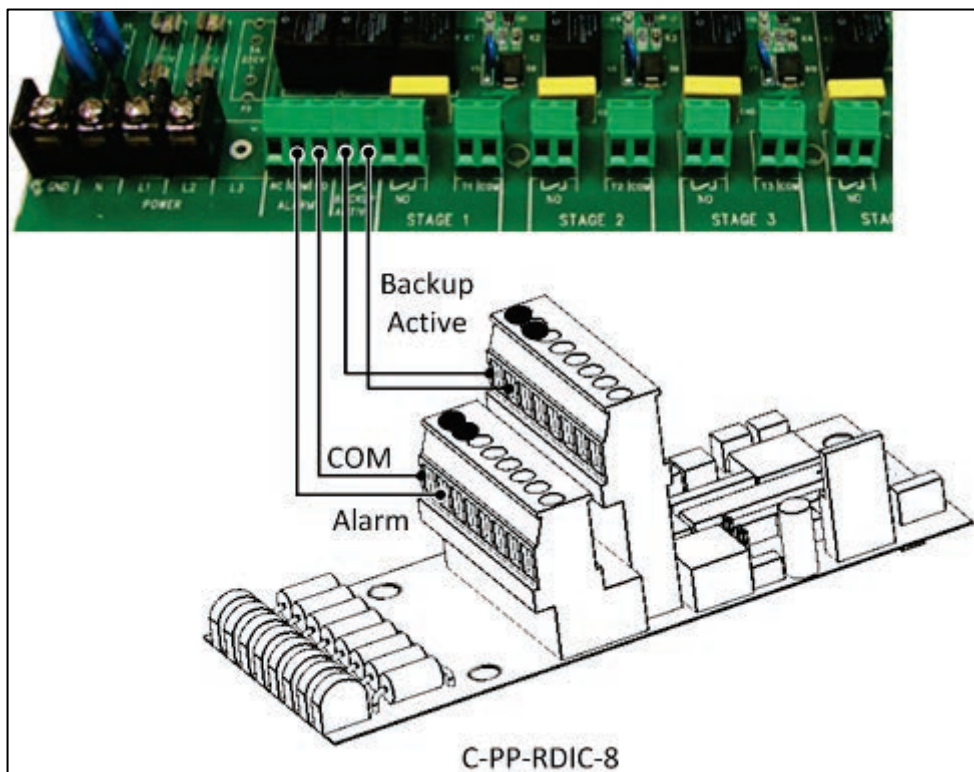


Figure 9: Wiring the Backup Alarm Ports to the Platinum Plus Digital Input Card

NOTE: When connecting the RDT-5 to a Platinum Junior controller, wire the input signal to the C-PPJ-DI8 card.

5.2.5 Powering the RDT

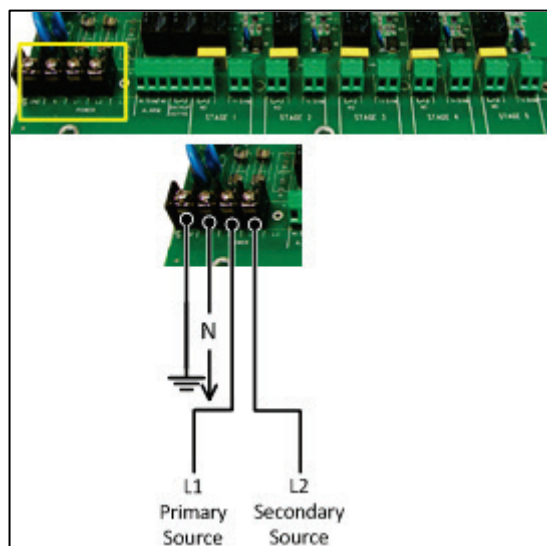


Figure 10: Powering the RDT-5

CAUTION When powering the RDT-5, the L1 and L2 ports must be fed from different power sources, phases, or breakers.

5.2.6 Alarm Wiring

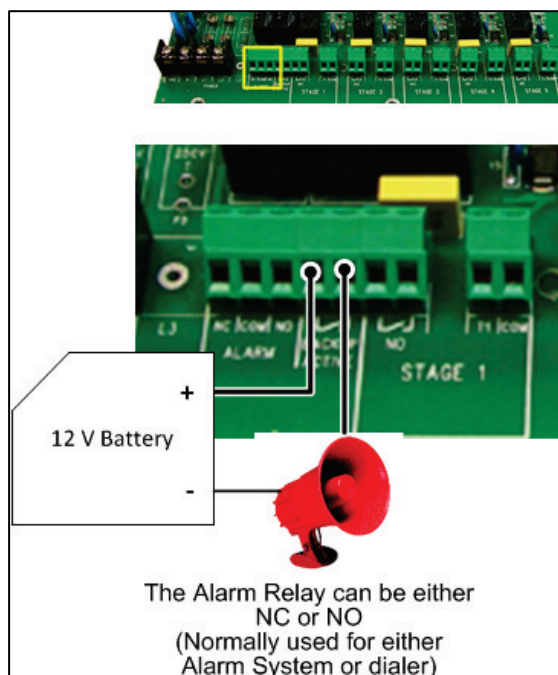


Figure 11: Alarm Port Wiring

An alarm is triggered when:

- either the primary or secondary power source fails
- a sensor is shorted or fails to operate
- the CPU fails

Note that even if the CPU ceases to operate, the RDT-5 continues to function. The CPU does not run the unit; it is used only to enter the unit parameters.



6 SPECIFICATIONS

Power Supply

Mains voltage primary	Dual phase, 115 VAC
Main fuse primary	5 A
Secondary fuse	1.25 A
Maximum power consumption	10 VA
Available power for peripheral equipment	

Relays Outputs

6 N.O. power relay	5 Amps, 250 VAC
1 N.O/N.C power relay	5 Amps, 250 VAC

Housing

Dimensions (L x W x H)	30 x 20 x 15 cm
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Ambient Climate

Operating temperature range	14° to 140° F
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Analog Inputs

5 temperature inputs

CAUTION RDT-5 ceases to operate outside of the operating temperature range.

7 ELECTRICAL GROUNDING FOR CONTROLLERS

Electrical equipment can be destroyed or slowly damaged by voltage spikes, lightning hits, etc. Proper electrical grounding in combination with the SMART-8CV internal protections is essential to protect the system, reduce the risk of damage and prolong its lifetime. Correct selection and installation of equipment will protect your system and reduce the risk of human injury.

Proper grounding provides an easy path for electrical current to return to its source. A grounding system should tie all non-current carrying conductors to earth ground (0 volts). The grounding system should present a minimum resistance to current flow. Make sure all items used are in proper condition; for example, a corroded wire clamp attaching a ground wire to a ground rod might add 100 ohms or more resistance to a system. Less than 5 ohm will be considered a good ground.

7.1 Ground Rods

Ground rods are used to efficiently connect the system to earth where current may be dissipated in the soil.

- Material: Ground rods should be copper clad or galvanized steel.
- Diameter: Minimum 5/8", preferably 3/4". Generally the larger the rod diameter, the lower its resistance to current flow.
- Length: Minimum 2.5 meters (8 feet), preferably 3-meter (10-foot). A longer ground rod will reach a soil with higher moisture content. Moist soil carries current much better than drier soil.
- Single grounding: It is important that there is only one grounding location where a rod or series of rods are connected to each other using a ground wire.
- Independent ground rods will increase the risk of current, from a lightning strike for example, being dissipated through one rod and reentering the system through an adjacent rod.
- Location: Close to the main circuit breaker panel and in moist soil. For example in an area that is usually wet from a drip or a low spot where water drains. Make sure the area is well protected from damage by lawnmowers, tractors, etc.
- Rod installation: Drive the rod into the earth until about 10 cm (4 inches) is left above grade. If it is impossible to drive the rod to the proper depth, it is acceptable to lay the rod horizontally, 80 cm (2.5 feet) below grade.
- In case the rod is exposed to damage, for example by lawnmowers or tractors, it can be installed in a hole, about 20 cm (8 inches) deep so that the rod is about 10 cm under grade and 10 cm above hole level.



The National Electric Code (NEC) mandates two ground rods unless you can show less than 10 ohms resistance with one rod.

7.2 Ground Wire

The ground wire is a large copper wire that connects the main circuit breaker panel to the ground rod.

- Material: Ground rods should be copper clad or galvanized steel.
- Diameter: Typically, 16 mm (6-gauge) copper wire is sufficient. If the wire run is greater than 20 feet, 20 mm (4-gauge) wire should be used.
- Length: Minimum 2.5 meters (8 feet), preferably 3-meter (10-foot). A longer ground rod will reach a soil with higher moisture content. Moist soil carries current much better than drier soil.



The ground wire should be protected from damage by lawnmowers, tractors, etc. It should be buried minimum 15 cm (6 inches) underground for protection and enter the house as soon as possible. It is important that the wire not be cut; it should remain continuous.

7.3 Ground Clamps

Ground wires should not be merely wrapped around a ground rod. Ground clamps are used to attach a ground wire to a ground rod. The most common clamp is an acorn clamp. Make sure the ground clamps you select are rated for outdoor use. Do not use pipe clamps rated for inside water lines or hose clamps to attach the ground wire.



Figure 12: Ground Connection

7.4 What Should Be Grounded?

Any equipment that is or could become energized, even accidentally, should be grounded. Current from lightning strikes objects in a random fashion. Accounts of lightning strikes reveal scenarios most of us could not predict.

Electric circuits should be wired with a 3-wire conductor consisting of hot, neutral and grounding wires. The grounding wire should be attached cleanly and securely to devices or systems to be grounded. The other end of the grounding wire should be attached to the ground bus on the main panel.